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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/998,380

11/29/2001

Paul Jeffrey Ungar

MS1-1028US

6959

7590

10/13/2004

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EXAMINER

PAPPAS, PETER

ART UNIT

PAPER NUMBER

2671

DATE MAILED: 10/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/998,380

Applicant(s)

UNGAR, PAUL JEFFREY

Examiner

Peter-Anthony Pappas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-14 and 27-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-14 and 27-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Allowable Subject Matter***

1. The indicated allowability of claims 13 and 30 is withdrawn in view of new grounds of rejection cited in this Office Action.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 2-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. In regards to claim 13 it is unclear as to connection between the reflection image(s) disclosed on lines 11, 13, and 15-18. For example, it is unclear if the reflection images generated on lines 15-16, in which one of said generated reflection images is chosen, correspond in some way to the reflection image loaded into memory on line 11 or if they are independent. Thus, for the purposes of art rejection they are considered independent.

5. In regards to claims 2, 7, 9 and 14 the language "wherein the loading," lines 11-12, 89, 15-16 and 20-21 respectively, is unclear as to whether said language refers to the "loading a reflection image into memory" (claim 13, line 11), "loading a predetermine reflection image" (claim 13, lines 17-18) or both. Thus, for the purposes of art rejection said language is considered to read on "loading a reflection image into memory" (claim 13, line 11).

6. In regards to claims 10 and 11 the language "the reflection image," lines 21 and 1 respectively, is unclear, because it is not clear as to what reflection image of claim 13 said language is referring too. Thus, for the purposes of art rejection said language is considered to refer to "loading a reflection image into memory" (claim 13, line 11).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 13-14, 2-4, 6 and 8-12 are rejected under 35 U.S.C. 103(a) as being obvious over Morgan et al. (U.S. Patent No. 6, 384, 824 B1) in view of Katayama et al. (U.S. Patent No. 6, 445, 807 B1).

The applied reference Morgan et al. has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application

and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

9. In regards to claim 13 Morgan et al. teaches a method, system and computer program product for multi-pass bump-mapping into an environment map, wherein a reflection vector at a given pixel position is generated (column 4, lines 18-31). During the first pass a reflection vector color is temporarily stored within frame buffer 650 (reflection image). During the second pass texture coordinate generator 620 converts said reflection vector color, stored in frame buffer 650, to environment map texture coordinates. Environmental mapper 636 then looks up environment map texel(s), based on said environment map texture coordinates, and then access at least one texel (environment texture sample) in environment map 652. Final pixel data is then output to frame buffer 650 and a final image representative of the geometry data bump mapped into an environment map is then output for display on display unit 660. (column 8, lines 43-67, and column 9, lines 1-35; Fig. 6). It is noted that a frame buffer is considered an array of pixels that encode reflection (i.e. color) data.

Morgan et al. fails to explicitly teach generating a plurality of reflection images, wherein each of the plurality of reflection images corresponds to a particular viewpoint;

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and loading a predetermined reflection image chosen from the plurality of reflection images into the memory. Katayama et al. teaches that images of an object, taken at a plurality of viewpoint positions, are input together with information indicating the plurality of viewpoint positions, and the viewpoint position of an observer is detected. One of the input images is selected on the basis of the detected viewpoint position of the observer, and the scan line of the image is determined in accordance with the viewpoint position of the observer and the viewpoint position upon taking the selected image, thereby generating an image from the viewpoint position of the observer (Abstract).

It would have been obvious to one skilled in the art, at the time of the applicant's invention, to combine the teaching of Katayama et al. with that of Morgan et al., because selecting an image, i.e. for display or further processing, based on the viewpoint of a given observer provides the most relevant information respective to the observer, rather than information which would not be relevant to the particular viewpoint of said observer, i.e. outside of their view, thus saving a system from processing or displaying unnecessary or unwanted information.

10. In regards to claim 14 Morgan et. al. and Katayama et al. fail to explicitly teach real time loading, retrieving and applying. Morgan et al. teaches each of the vectors  $N'$  and  $V$ , of a reflection vector  $R$ , can be unnormalized or normalized according to the present invention (column 7, lines 45-55). Voorhies et al. teaches a method and apparatus for generating reflection vectors without normalization, allowing for the generation of surface reflections at real time speeds as well as allowing the user to

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interactively manipulate the computer images presented by such systems (column 8, lines 14-17; column 16, lines 30-44).

It would have been obvious to one skilled in the art, at the time of the applicant's invention, to incorporate the generation of surface reflections at real time speeds, as taught by Voorhies et al., into the system taught by Morgan et al. and Katayama et al., because both Morgan et al. and Voorhies et al. lend to the use of unnormalized vectors and such an incorporation would allow for a given user to interactively manipulate the computer images, exhibiting said surface reflections, presented by such a system in real time, thus immediately seeing the result of said manipulations without delay which would be present if said processing was not accomplished in real time.

11. In regards to claim 2 Morgan et. al and Katayama et al. fail to explicitly teach the use of a red, green and blue (RGB) color space. It is extremely well known for

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computer graphics system to operate in a conventional color space, such as RGB (official notice; MPEP § 2144), and thus it would have been obvious to one skilled in the art, at the time of the applicant's invention, to utilize said conventional color space, because by utilizing said conventional color space for a given computer graphics system would allow for uniformity, which in turn allow for said computer graphics system to more easily be incorporated with additional graphic systems, hardware and techniques for further processing and display.

12. In regards to claim 3 Morgan et. al. teaches that a lightning equation used to determine a lighting color value  $L_c$ , wherein the variables of said lighting equation include, but are not limited too, an ambient light color, a diffused light color, a specular

light color and an environment mapping color coefficient (column 7, lines 21-45). The terms in said lighting equation can be set so to represent a reflection vector  $R$ . The result being that the output value  $L_c$ , of the overloaded lighting equation, equals a reflection vector  $R$  (column 7, lines 60-67, and column 8, lines 1-4). The motivation disclosed in the rejection of claim 2 is incorporated herein.

13. In regards to claim 4 the rationale disclosed in the rejection of claims 2 is incorporated herein.

14. In regards to claim 6 Morgan et al. teaches a multi-pass system for bump-mapping into an environment map, wherein a reflection vector of a perturbed normal at a given pixel position is generated during the first pass prior to retrieving the environment texture sample (column 4, lines 18-31).

15. In regards to claim 8 the rationale disclosed in the rejection of claim 13 is incorporated herein.

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16. In regards to claim 9 the rationale disclosed in the rejection of claim 13 is incorporated herein.

17. In regards to claim 10 the rationale disclosed in the rejection of claim 13 is incorporated herein.

18. In regards to claim 11 it is noted said frame buffer 650 is considered memory for the storage of texture (i.e. color) data. Morgan et al. teaches that prior to the second pass the graphics pipeline is set-up and enabled for environment mapping and pixel texture (column 8, lines 32-35). Morgan et al. also teaches storing environment map 652 within texture memory 606 (Fig. 6).



Morgan et al. and Katayama et al. fail to explicitly teach loading the environment map in the texture memory prior to performing the retrieving and the applying. It is extremely well known to load data into memory prior to performing instructions, wherein said instructions require the accessing and retrieving of information from said data (official notice; MPEP § 2144), and thus it would have been obvious to one skilled in the art, at the time of the applicant's invention, to load the environment map, taught by Morgan et al., into texture memory prior to the accessing of texture memory for environment map information, because if said environment map data was not loaded prior to the request for accessing said data the system would fail in making the attempt to retrieve said data, as there would be no environment map to access.

19. In regards to claim 12 Morgan et. al. teaches that any type of environment map can be used, such as a cubic or spherical environment map (column 8, lines 32-35).

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20. Claims 5 rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan et al. (U.S. Patent No. 6, 384, 824 B1) and Katayama et al. (U.S. Patent No. 6, 445, 807 B1), as applied to claims 13-14, 2-4, 6 and 8-12, in view of Foley et al. (Computer Graphics: Principles and Practice).

21. In regards to claim 5 Morgan et al. and Katayama et al. fail to explicitly teach wherein the applying comprises replacing the red, green and blue color data of the pixel with the red, green and blue color data of the environment texture sample. Foley et al. teaches that at each rendered pixel, selected texels are used either to substitute for or to scale one or more of the surface's material properties. One pixel is often covered (replaced) by a number of texels (page 742). Foley et al. also teaches that bump

mapping is based on texture mapping (page 744). The rationale disclosed in the rejection of claim 2 is incorporated herein.

It would have been obvious to one skilled in the art, at the time of the applicant's invention, to incorporate texture mapping as taught by Foley et al. into the system taught by Morgan et al. and Katayama et al., which utilizes bump mapping, because as taught by Foley et al. during texture mapping one pixel is often covered (replaced) by a number of texels and this serves to further detail the process of bump mapping, which is based on texture mapping, outlined by Morgan et al. and Katayama et al., but which is not explained in detail.

22. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan et al. (U.S. Patent No. 6, 384, 824 B1) and Katayama et al. (U.S. Patent No. 6, 445, 807 B1), as applied to claims 13-14, 2-4, 6 and 8-12, in view of Ho et al. (U.S. Patent No. 6, 297, 833 B1), and in further view of Fosner (*Microsoft Systems Journal: DirectX 6.0 Goes Ballistic With Multiple New Features and Much Faster Code*).

23. In regards to claim 7 Morgan et al. and Katayama et al. fail to explicitly teach loading, retrieving and applying performed during a single pass through the graphics pipeline. Ho et al. teaches a multi-stage single pass graphics accelerator pipeline, used to map irregular textures to surfaces, in which loading, retrieving and applying are accomplished through the following grouped stages, respectively: front end stage, setup and rasterizer stages, texture and combiner stages (column 1, lines 55-58; column 2, lines 31-67, and column 3, lines 1-33; column 6, lines 46-63; column 7, lines 36-58; column 8, lines 15-23; Fig. 7).

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It would have been obvious to one skilled in the art, at the time of the applicant's invention, to incorporate a single pass graphics processing (accelerator) pipeline as an alternative to that of a multi-pass graphics processing pipeline, as taught by Morgan et al., because, as taught by Fosner, multi-pass rendering involves the rendering of a given scene a multiple number of times, resulting in a significant impact on the rendering time, however, utilizing new interfaces in combination with single pass rendering result in greatly improved performance for applications that previously used multi-pass techniques (page 9, § Single-pass Multitexture Support).

***Claim Rejections - 35 USC § 102***

24. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

25. Claim 30 and 27-29 rejected under 35 U.S.C. 102(e) as being anticipated by Morgan et al. (U.S. Patent No. 6, 384, 824 B1).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

26. In regards to claim 30 Morgan et. al. teaches a method, system and computer program product for bump-mapping into an environment map via multiple passes (column 4, lines 10-12; Fig. 8, 804). A computer system 800 that includes one or more processors, graphics subsystem 803, main memory 808 and secondary memory 810. The secondary memory can include a storage drive 814 that reads from and/or writes to a removable storage unit 818. The removable storage unit 818 includes a computer usable storage medium having stored therein computer software and/or data (column 10, lines 35-67, and column 11, lines 1-33).

During pass 1 texture coordinate generator 620 generates bump map coordinates. Texture application 630 uses the generated bump map coordinates to fetch a perturbed normal from bump map (texture map) 622 and further overloads the lighting equation. Bump mapper 634 outputs the perturbed normal  $N'$  to lighting block 640. Phong shader 642 then evaluates the overloaded lighting equation using the terms received from texture applicator 630 to generate the reflection vector color  $R_c$  as described above with respect to step 420. The reflection vector color  $R_c$  can then be stored temporarily in frame buffer 650 (column 8, lines 43-67, and column 9, lines 1-35;

Fig. 6). The rationale disclosed in the rejection of claim 13, in regards to pass 2, is incorporated herein.

Morgan et al. teaches that the reflection vector  $R = 2N'(N' \cdot V) - V$ , wherein  $V$  is a viewing vector at the pixel position. It is noted said viewing vector is considered to define a given viewpoint.

27. In regards to claim 27 the rationale disclosed in the rejection of claim 2 is incorporated herein.

28. In regards to claim 28 the rationale disclosed in the rejection of claim 4 is incorporated herein.

29. In regards to claim 29 the rationale disclosed in the rejection of claim 12 is incorporated herein.

### ***Response to Arguments***

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30. In lieu of the new ground of rejection this Office Action is non-final.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter-Anthony Pappas whose telephone number is 703-305-8984. The examiner can normally be reached on M-F 10:00am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 703-305-9798. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Peter-Anthony Pappas  
Examiner  
Art Unit 2671

PAP



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MARK ZIMMERMAN  
SUPERVISORY PATENT EXAMINER  
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